



A model of sequential reforms and economic convergence: The case of China[☆]



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ABSTRACT

Motivated by China's experience, a growth model is developed to explain the repeated interaction between economic reforms and growth in a developing country. Convergence occurs until the developing country reaches a bottleneck, then convergence stops unless the institution is improved. After the reform, convergence resumes until a new bottleneck is encountered, which triggers another reform, and so on. Using recursive methods, I show analytically that, in a perfect international credit market, each reform occurs when the new growth bottleneck just becomes binding; the reform size changes monotonically over time; there are finite reforms and convergence is unceasing until the last constraint binds, so a permanent GDP gap may exist. The model also implies that a politically more powerful government should adopt more gradual reforms. In an imperfect credit market, convergence can be delayed and an initially richer economy can be more likely to adopt insufficient reforms.

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1. Introduction

The last several decades witnessed institutional transitions in China, India, Russia, Vietnam, and many other developing countries. Some were successful and managed to converge to the richest economies, but others failed. To understand why, Rodrik (2005) reviews a vast pertinent literature of reforms and economic accelerations. He finds that economic accelerations (not mere recoveries from recessions) typically occur after certain binding institutional bottlenecks are relaxed. Moreover, to ignite economic convergence in a developing economy may only need a small institutional or policy change, but to sustain the convergence it would require a process of cumulative institutional building along the way:

“In the long run, the main thing that ensures convergence with the living standards of advanced countries is the acquisition of high-quality institutions. The growth-spurring strategies have to be complemented over time with a cumulative process of institution building to ensure that growth does not run out of steam...”

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This also echoes the increasingly popular view that institutions are fundamental causes of long-run growth (see Acemoglu, Johnson, and Robinson (2005); Hall and Jones (1999); North (1990)). Surprisingly, however, there exist few, if any, theoretical models that explicitly characterize how economic convergence occurs with an *endogenously cumulative process of institutional building* in the standard growth/convergence framework.¹ In this paper I aim to help fill this gap.

China is a case in point for such investigations. It has undertaken gradualist reforms and achieved spectacular convergence in the past three decades. In this process there is a salient feature: a policy or institutional reform ignites economic convergence, which continues until the economy meets a new binding constraint. Then another reform is undertaken to eliminate this new growth obstacle. Convergence resumes afterwards until another new binding constraint arises, so on and so forth. In other words, economic convergence triggers, and is also sustained by, endogenous and successive institutional reforms.²

In this paper, I develop a formal model to capture precisely this interactive process between economic growth (convergence) and sequential relaxations of newly-binding constraints, which is so far only informally described in the literature. The focus is on the analytical characterization of their mechanical interactions. I discipline the modeling by making minimum deviations from standard growth models. To maintain tractability, I put forth a highly parsimonious model to address two normative questions: what is the first-best reform scheme and how does it interact with economic convergence? The model is adapted from the endogenous growth framework developed by Lucas (1988, 2009). The issues addressed here are also closely related to the question how to eliminate barriers to adopting better foreign technology (see Parente and Prescott (1994, 2000)).³

In the existing growth literature, economic convergence is usually studied with institutions and policy barriers taken as exogenous and time-invariant (Barro & Sala-i-Martin, 1992; Ngai, 2004; Stokey, 2012). My approach is different in that the barrier is an endogenous policy variable instead of an exogenous parameter. Economic reforms are modeled as endogenous reduction of this barrier variable. Similar to Lucas (2009), there is a developing economy and an exogenously growing developed economy. Growth occurs with the accumulation of human capital, which should be interpreted as a proxy for the composite of all the production factors and technology. The initially large gap in human capital (and GDP) allows the poor economy to catch up thanks to knowledge spillover or technology diffusion. The new element in my model is that convergence stops when the gap shrinks to a threshold value, which depends on the barrier variable. This convergence bottleneck is referred to as a binding convergence constraint.

Economic reforms are costly. Each reform entails a fixed cost and a variable cost. The fixed cost may reflect how efficient the decision process of a reform is. For example, it includes all the implicit and explicit size-independent cost to formulate a reform plan and the cost to get the reform proposal formally approved. The variable cost includes all the rest of the implicit and explicit social cost associated with the reform and it is a convex function of the reform size, so the reform cost increases disproportionately more as the reform becomes more radical. Given the reform cost function, the benevolent social planner, or Ramsey government, formulates a barrier adjustment scheme, which specifies when and how much to change this barrier variable to maximize social welfare.

Using recursive methods, I analytically characterize this non-stationary dynamic optimization problem to show how economic growth triggers barrier reduction (institutional reforms) and how reforms feedback on factor accumulation and growth dynamics. The model is able to generate the pattern of repeated interactions between reforms and growth observed in reality (outlined above). In addition, four main results are obtained. First, each reform occurs precisely when the convergence constraint becomes binding. Second, the magnitude and frequency of reforms are both monotonic over time. More precisely, if the reform size decreases (increases) over time, the frequency of reforms increases (decreases) over time. Third, the number of reforms is finite and the successive reforms support an unceasing convergence until the convergence constraint binds permanently. In the long run, a GDP gap may still exist but the two countries will have the same growth rate.⁴ Fourth, when the international credit market is imperfect, reforms may be delayed and the resulting convergence process can be punctuated and intermittent. In addition, there may exist an advantage to backwardness in reforms. That is, an initially richer economy is sometimes more likely to undertake insufficient reforms, because growth bottleneck is reached too soon, even before enough saving is accumulated. Following Parente and Prescott (2000), I place more emphases on level effect than growth effect in the analysis.⁵

The model developed here highlights the importance of cumulative and sequential reforms that underlie the entire process of economic convergence. At a superficial level, the course of convergence still appears to be fully dictated by human capital accumulation without any explicit role for the barrier variable, seemingly identical to the existing convergence literature with exogenous barriers. However, at a deeper level, my model mechanism strongly echoes the view of Acemoglu et al. (2005) and

¹ Acemoglu, Aghion, and Zilibotti (2006) show that, in order to achieve sustained development, the growth mode should switch from an investment-based strategy to an innovation-based strategy when a country gets closer to the world technology frontier. However, they do not emphasize the “cumulative process” of sequentially relaxing the new institutional constraints.

² Section 2 provides two concrete motivating stories to illustrate this pattern in China. For more discussions, also see Roland (2000), Naughton (2007), Rodrik (2010), Xu (2011), and Lin (2012). This pattern of repeated interactions between convergence and reform is also widely observed in other economies that succeeded in catching up after World War II (Rodrik, 2005; Wade, 1990; World Bank, 2005).

³ Klenow and Rodriguez-Clare (2005) provide a survey for human capital learning externality and economic growth. This paper is also closely related to discussions on human capital and technology diffusion by Benhabib and Spiegel (2005). Stokey (2012) examines explicitly the different roles played by human capital and technology diffusion in the catch-up process.

⁴ The above three results are all based on the assumption that the international credit market is perfect, which also implies that households' risk attitude or intertemporal elasticity of substitution does not affect any of these results, because uncertainty is fully insured away by the international market and the optimal reform schemes are not constrained by the short-run financial ability thanks to the international borrowing. The GDP time path remains unchanged, but the consumption growth rate depends on the intertemporal elasticity of substitution. However, refer to footnote 11 and Appendix 10 for more discussions.

⁵ In growth models with human capital learning externality (without institutional change), a standard result is that the developing and the developed countries grow at the same speed on the balanced growth path, as implied by the law of motion in the human capital diffusion (Klenow & Rodriguez-Clare, 2005). But the level difference can be still enormous. Parente and Prescott (2000) argue that it is important to look at the level effect as well.

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